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V. "Transformation of the Aromatic Monamines into Acids richer in Carbon.—III. On Menaphtylamine." By A. W. Hofmann, LL.D., F.R.S. Received June 1, 1868.

The transformation of naphthaline into its carboxylic acid suggests the existence of a large number of compounds which the progress of science cannot fail to realize. It is not my intention to examine in detail this group of substances, the composition and even the properties of which are sufficiently indicated by theory. There are nevertheless several terms of this series which I must not leave unprepared whilst engaged with this question. These are the aldehyde, the alcohol, and the monamine of the series. It is the latter substance of which I beg permission to submit to-day a short account to the Royal Society.

My first attempts to produce the aromatic monamine were anything but successful. Cyanide of naphthyl, when left in contact with zinc and sulphuric acid, even for weeks, was found to yield but trifling quantities of menaphtylamine. The greater portion of the nitrile was left unchanged, while more or less, by the absorption of the elements of water, was converted into menaphtoxylamide and even into menaphtoxylic acid. A slight modification, however, of the process usually adopted has removed these difficulties.

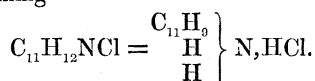
It is well known that M. Mendius, after he had discovered the remarkable property possessed by *nitriles* of fixing two molecules of hydrogen, has submitted also the *amides* to the action of hydrogen *in conditione nascendi*, in the hopes of replacing their oxygen by hydrogen, and of producing also in this manner the primary monamines. These experiments have not been successful. In the presence of the difficulties attending the preparation of menaphtylamine, the idea suggested itself of trying whether the sulphuretted amide of the series into which the nitrile is so easily transformed would not be more readily attacked by nascent hydrogen than the nitrile itself. The result of this experiment was highly satisfactory. On submitting an alcoholic solution of menaphtothiamide to the action of zinc and hydrochloric acid, torrents of sulphuretted hydrogen are at once evolved. The addition of zinc and hydrochloric acid, and sometimes also of a little alcohol, is continued, until, after a day or two, the disengagement of sulphuretted hydrogen almost ceases. The liquid is now mixed with concentrated soda until the precipitate of hydrate of zinc, which is formed in the commencement, is redissolved. An oily layer containing much soda and alcohol is seen to separate and to collect on the surface of the aqueous solution. This layer is removed and heated in the water-bath until the alcohol is volatilized. An aqueous liquid is thus produced, on which a yellow oil is floating. The latter is principally menaphtylamine, which is still mixed with a small quantity of cyanide of naphthyl regenerated from the thio-compound. The oil is treated with dilute hydrochloric acid, the hydro-

chloric liquid separated by filtration from the cyanide, and decomposed by hydrate of sodium, when the base separates in a state of purity.

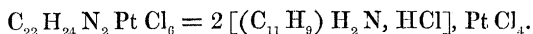
Menaphtylamine is a very caustic liquid, boiling between  $290^{\circ}$  and  $293^{\circ}$ . Freshly distilled it is colourless, but soon acquires a yellow tint. It attracts carbonic acid with such avidity that it is impossible to pour it from one vessel into another without a pellicle of the difficultly soluble carbonate being formed on its surface.

The composition of the base was sufficiently indicated by theory; it appeared nevertheless desirable to establish it experimentally by the analyses of the hydrochlorate and the platinum-salt.

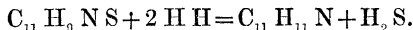
The hydrochlorate crystallizes with the greatest facility in difficultly soluble needles, containing



The yellow crystalline precipitate which is formed by the addition of perchloride of platinum to the hydrochlorate has the composition



The transformation of the thio-compound into menaphtylamine is thus seen simply to consist in the substitution of 2 atoms of hydrogen for 1 atom of sulphur:—



I have but little to say about the properties of menaphtylamine; nevertheless the extraordinary crystalline tendencies of its salts deserve to be mentioned. The sulphate and nitrate are likewise difficultly soluble; the latter crystallizes in splendid nitrelike prisms. In contact with bisulphide of carbon menaphtylamine solidifies at once to a crystalline mass. When treated with alcoholic soda and chloroform, it is converted into the terribly smelling *formomenaphtylnitrile*, which I propose to examine somewhat more in detail.

I have also prepared *benzylamine*, starting from thiobenzamide instead of benzonitrile. The experiment is of course likewise successful, the advantage, however, less conspicuous, since benzonitrile fixes hydrogen with far greater facility than the cyanide of naphthyl.

Be this, however, as it may, the facility with which hydrogen *in conditione nascendi* acts upon sulphur-compounds deserves to be noticed. I propose to examine in the direction indicated by the above experiments some of the more important sulphur-compounds, more especially the thio-acids of the fatty and aromatic series, and the two groups of sulphocyanic ethers. The investigation of the latter, indeed, has already furnished me results of great neatness and precision.

In conclusion, I must not leave unmentioned that, since my first communication on the menaphtan series, I have had an opportunity of removing the slight doubts respecting the identity of the acid obtained by the action

of oxalic acid upon naphthylamine with that procured by treating a naphthalin-sulphate with cyanide of potassium. M. V. Merz had found the fusing-point of the latter acid to be  $140^{\circ}$ , whilst for the former I had observed the fusing-point  $160^{\circ}$ . M. O. Olshausen has since prepared in my laboratory a quantity of cyanide of naphthyl according to Merz's process. The acid obtained from this cyanide by treatment with an alkali, thrice recrystallized and finally purified by distillation, was likewise found to fuse exactly at  $160^{\circ}$ . Menaphtoxylamide, procured from the same source, exhibited the fusing-point  $203^{\circ}$ , while the compound I had formerly examined fused at  $204^{\circ}$  \*. The identity of the acids obtained by the two processes is thus satisfactorily established.

- VI. "Account of some recent Observations on Sun-spots, made at the Kew Observatory." By WARREN DE LA RUE, Esq., F.R.S., BALFOUR STEWART, Esq., F.R.S., and BENJAMIN LOEWY, Esq., F.R.A.S. Received June 2, 1868.

(Abstract.)

The authors, after reviewing briefly the two theories on the nature of sun-spots, which are still subjects of dispute, refer to the stereoscopic views obtained and the results published in their 'Researches on Solar Physics,' and state the reasons which have led them to believe that sun-spots are cavities and at a lower level than the sun's photosphere. Their opinion has been recently strengthened by observations of a sun-spot on the 7th of May, which in disappearing produced in two successive photograms indentations in the west limb.

After proving by the measurements made, which, with the calculations, are appended to their paper, that there can be no doubt about the identity of the heliographical elements of the previously observed spot and the successive indentations, they prove from the established details of the phenomena of sun-spots that such indentations must under all circumstances be very rare occurrences, and state fully the conditions favourable to the recurrence of similar observations, inviting observers to give their particular attention to them.

- VII. "The Formation and Early Growth of the Bones of the Human Face." By GEORGE W. CALLENDER, Lecturer on Anatomy at St. Bartholomew's Hospital. Communicated by JAMES PAGET, F.R.S. Received June 2, 1868.

(Abstract.)

These notes refer to some few points with which we are as yet imper-

\* The fusing-point of this substance is, by misprint (Proc. Roy. Soc. vol. xvi. p. 302), stated to be  $244^{\circ}$ , instead of  $204^{\circ}$ .—A. W. H.